What is claimed is:

1. A motor control device for driving, based on a speed command signal, a motor coupled to a mechanical load associated with a mechanical system having a resonance frequency and an anti-resonance frequency, the motor control device having in a speed control loop detection speed of the motor, and comprising:

a speed control means for outputting a drive command signal for the motor so as to make the speed of the motor conform to the speed command signal, based on a signal indicating the difference between the speed command signal and the detection speed of the motor; and

a filter inserted in series with the speed control means in the speed control loop, the filter having frequency-dependent phase lag characteristics divided into a high frequency domain, a low frequency domain, and an intermediate frequency domain between the high frequency domain and the low frequency domain, and in which the gain *KL* in the low frequency domain is larger than the gain *KH* in the high frequency domain, and in which the phase is delayed in the intermediate frequency domain; wherein

the speed control means includes a proportional controller for multiplying input by a proportional gain *KP* and outputting the result, as well as an integral controller for adding the value of the input multiplied by the proportional gain *KP*, and the integral of the input multiplied by an integral gain *KI*, and outputting the result; and

filter settings are adjusted so that frequency the phase of the filter is delayed at frequency domain between the resonance frequency and the anti-resonance.

2. A motor control device for driving, based on a speed command signal, a motor coupled to a mechanical load associated with a mechanical system having a resonance frequency and an anti-resonance frequency, detected motor speed being available to the device in a speed control loop, the motor control device comprising:

a speed control means for outputting a drive command signal for the motor so as to make the speed of the motor conform to the speed command signal, based on a signal indicating the difference between the speed command signal and the detected speed of the motor; and

a filter inserted in series with the speed control means in the speed control loop, the filter having frequency-dependent phase lag characteristics divided into a high frequency domain, a low frequency domain, and an intermediate frequency domain between the high frequency domain and the low frequency domain, and in which the gain KL in the low frequency domain is larger than the gain KH in the high frequency domain, and in which the phase in the intermediate frequency domain is delayed; wherein

the speed control means includes a proportional controller for multiplying input by a proportional gain KP and outputting the result, as well as an integral controller for adding the value of the input

multiplied by the proportional gain KP, and the integral of the input multiplied by an integral gain KI, and outputting the result; and

filter settings are adjusted so that the phase is delayed when the speed command signal is between a first crossover frequency ω_{C1}, being the value obtained by dividing the product of the proportional gain KP and the gain KL by the inertial moment J of the mechanical system, and a second crossover frequency ω_{C2}, being the value obtained by dividing the product of the proportional gain KP and the gain KH by the inertial moment JM of the motor.

3. A motor control device for driving, based on a speed command signal, a motor coupled to a mechanical load associated with a mechanical system having a resonance frequency and an anti-resonance frequency, detected motor speed being available to the device in a speed control loop, the motor control device comprising:

a speed control means for outputting a drive command signal for the motor so as to make the speed of the motor conform to the speed command signal, based on a signal indicating the difference between the speed command signal and the detected speed of the motor; and

a filter inserted in series with the speed control means in the speed control loop, the filter having frequency-dependent phase lag characteristics with an approximately constant gain KL in a frequency domain lower than a first filter frequency ω_{F1}, and an approximately constant gain KH, smaller than the gain KL, in a

frequency domain higher than a second filter frequency ω_{F2}, in which the phase is delayed between the first filter frequency ω_{F1} and the second filter frequency ω_{F2}; wherein

the speed control means has a proportional control computation means for multiplying input by a proportional gain *KP* and outputting the result, as well as a proportional integral control computation means for adding the value of the input multiplied by the proportional gain *KP*, and the integral of the input multiplied by an integral gain *KI*, and outputting the result; and

filter settings are adjusted so that the ratio between an crossover frequency ω_{C1}, being the value obtained by dividing the product of the proportional gain *KP* and the gain *KL* by the inertial moment *J* of the mechanical system, and the first filter frequency ω_{F1}, is approximately constant.

4. A motor control device for drive-controlling a mechanical system, having a resonance frequency and an anti-resonance frequency, made up of a mechanical load coupled to a motor, the motor control device by means of a speed control loop drive-controlling detected speed of the motor based on a speed command signal, and comprising:

a filter inserted in series with a speed control means in the speed control loop, the filter having frequency-dependent phase lag characteristics in an intermediate frequency domain between a low frequency domain and a high frequency domain, with an

approximately constant gain *KL* in the low frequency domain being lower than a first filter frequency $\omega F1$, and an approximately constant gain *KH*, smaller than the gain *KL*, in the high frequency domain being higher than a second filter frequency $\omega F2$; and

a parameter setting means for setting parameters for the filter characteristics and the speed control means; wherein

the speed control means has an integral controller for adding the value of the input multiplied by a proportional gain *KP*, and the integral of the input multiplied by an integral gain *KI* , and outputting the result; and

filter settings are adjusted so that the ratio between an crossover frequency $\omega C1$, being the value obtained by dividing the product of the proportional gain *KP* and the gain *KL* by the inertial moment J of the mechanical system, and the first filter frequency $\omega F1$, is approximately constant, and so that the ratio between a zero-point frequency ω_{P1}, being the value obtained by dividing the integral gain *KI* by the proportional gain *KP*, and the crossover frequency $\omega C1$ is approximately constant.

5. The motor control device according to claim 3 or 4, being furnished with a parameter setting means for setting parameters for the filter and the speed control means, wherein the parameter setting means sets the parameters so that, if an inertial ratio, being the value obtained by dividing the inertial moment J of the mechanical system by an inertial moment JM of the motor, is large, the ratio of

the second filter frequency ω_{F2} to the first filter frequency ω_{F1} will be large.

6. The motor control device according to claim 3 or 4, being furnished with a parameter setting means for setting parameters for the filter and the speed control means, wherein the parameter setting means inputs to the filter a gain ratio, being the ratio between the gain *KL* and the gain *KH*, or a frequency ratio, being the ratio between the second filter frequency ω_{F2} and the first filter frequency ω_{F1}, to set the parameters for the filter characteristics based on the gain ratio or the frequency ratio.

7. A motor control device for driving, based on a speed command signal, a motor coupled to a mechanical load associated with a mechanical system having a resonance frequency and an anti-resonance frequency, detected motor speed being available to the device in a speed control loop, the motor control device comprising:

a speed control means for outputting a drive command signal for the motor so as to make the speed of the motor conform to the speed command signal, based on a signal indicating the difference between the speed command signal and the detected speed of the motor;

a filter inserted in series with the speed control means in the speed control loop, the filter having frequency-dependent phase lag characteristics divided into a high frequency domain, a low frequency

domain, and an intermediate frequency domain between the high frequency domain and the low frequency domain, and in which the gain *KL* in the low frequency domain is larger than the gain *KH* in the high frequency domain, and in which the phase in the intermediate frequency domain is delayed;

a frequency response acquisition means for acquiring frequency response of the mechanical system; and

a parameter setting means for setting characteristics of the filter; wherein

the parameter setting means, based on the frequency response of the mechanical system acquired by the frequency response acquisition means, parameterizes the filter characteristics so that between the anti-resonance frequency and the resonance frequency of the mechanical system phase in the filter is delayed.